REMARKS

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have amended claim 1 to further clarify that in Step 2 of adding the diamine component dropwise to the suspension, the diamine component added comprises 70 mol% or more of m-xylylenediamine (consistent with recitation of the diamine component previously recited in claim 1).

In addition, Applicants are adding new claims 10-15 to the application. Claims 10 and 11, each dependent on claim 1, respectively recites that the diamine component added in Step 4 is the same diamine component as that added in Step 2; and recites that the dicarboxylic acid component comprises 70-95 mol% of straight-chain α, ω aliphatic dicarboxylic acid and 5-30 mol% of aromatic dicarboxylic acid. Claims 12 and 13, each dependent on claim 1, respectively further defines the total amount of diamine component added while the reaction system is in the suspension stage; and recites sequencing of the Steps 3 and 4. Claims 14 and 15, each dependent on claim 1, further define amount of the diamine component, defining amount thereof added in Step 2.

In connection with amendments to previously considered claims, and in connection with the newly added claims, note, for example, pages 5-10 of Applicants' specification.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the reference applied by the Examiner in rejecting claims in the Office Action mailed June 9, 2005, that is, the teachings of European Patent Application No. 680987 of Harada, et al., under the provisions of 35 USC 102 and 35 USC 103.

Initially, it is noted that the claims have been rejected "under 35 U.S.C. 102(e)" as being anticipated by Harada, et al. It is emphasized that Harada, et al. is a European patent application. Accordingly, the rejection under 35 USC 102(e) is clearly improper, since 35 USC 102(e) requires the invention to be described in an application for patent filed in the United States. Reconsideration and withdrawal of the rejection under 35 USC 102(e), on this basis alone, is respectfully requested.

In any event, it is respectfully submitted that Harada, et al. would have neither taught nor would have suggested such a method of producing a polyamide by a polycondensation of, inter alia, a dicarboxylic acid component comprising 60-95 mol% of a straight-chain α, ω aliphatic dicarboxylic acid and 5-40 mol% of an aromatic dicarboxylic acid, as in the present claims, the method including, inter alia, heating to obtain a suspension of the aromatic dicarboxylic acid in a molten straight-chain α, ω-aliphatic dicarboxylic acid and adding the diamine component comprising 70 mol% or more of m-xylylenediamine to the suspension, with the reaction system being heated to allow the reaction system to change from a suspension phase into a homogenous molten phase and the diamine component being further added while maintaining the homogenous molten phase, 20-60% by weight of a total amount of the diamine component being added while the reaction system is in the suspension phase before changing into the homogenous molten phase. See claim 1.

In addition, it is respectfully submitted that the applied reference would have neither disclosed nor would have suggested such method as in the present claims, having features as discussed previously in connection with claim 1, and, additionally, wherein the diamine component added in Step 4 is the same diamine component as that added in Step 2 (see claim 10); and/or wherein the diamine component is added continuously or intermittently in Step 2, over 10-150 minutes (see claim 5); and/or

wherein the reaction system is continuously or intermittently heated over 0-30 minutes to allow the reaction system to change from the suspension phase into the homogenous molten phase (see claim 6), particularly wherein the reaction system is heated at a temperature rise rate of 0.05-5°C/minute (see claim 7); and/or percentage by weight, of the total amount of the diamine component, added in Step 4, with the amount of time of further addition of the diamine component in Step 4, as in claim 8; and/or amount of time of Step 5, as in claim 9; and/or materials of the aromatic dicarboxylic acid (see claim 2), and straight-chain α, ω-aliphatic dicarboxylic acid as in claims 3 and 4; and/or further definition of amounts of materials of the dicarboxylic acid component as in claim 11; and/or further definition of the total amount of the diamine component that is added while the reaction system is in the suspension phase, as in claim 12; and/or amount of m-xylylenediamine included in the diamine component and added in Step 2 to the suspension, as in claims 14 and 15.

The present invention is directed to a method of producing a polyamide, to provide a highly efficient production method which forms a polyamide with minimized discoloration and deterioration and with excellent and stable properties.

Polyamide mainly constituted by m-xylylenediamine and adipic acid has previously been used as a raw material for production of molding materials and packaging materials. However, problems arise in connection therewith, when combined with a resin having a lower melting point. In order to overcome these problems, it has been proposed to introduce randomly m-xylylenediamine/aromatic dicarboxylic acid repeating units. Proposed methods in connection therewith first prepare a molten mixture of dicarboxylic acids by adding an aromatic dicarboxylic acid to a molten adipic acid or by melting a mixture of adipic acid and an aromatic

dicarboxylic acid under heating, and then adding m-xylylenediamine dropwise into the molten mixture of dicarboxylic acids. Note, for example, page 2, lines 9-13, of Applicants' specification.

However, generally, the melting point of the aromatic dicarboxylic acid is higher than that of the straight-chain dicarboxylic acid used, and there is a temperature range in which the mixture of dicarboxylic acids is in a suspension phase. When a large amount of the diamine is added dropwise into a mixture in the suspension phase, the added diamine reacts with the molten adipic acid in preference to the solid aromatic dicarboxylic acid; and, therefore, reaction between the diamine and aromatic dicarboxylic acid does not proceed sufficiently. In addition, the diamine/aromatic dicarboxylic acid repeating units are not randomly introduced in the backbone of the polyamide, but form distinct blocks, thereby likely to result in failure of reducing the melting point of the polyamide so as likely to make mechanical and chemical properties unstable. Note, in particular, the paragraph bridging pages 2 and 3 of Applicants' specification.

While it has also been proposed to produce a polyamide with randomly arranged m-xylylenediamine/adipic acid repeating units and m-xylylenediamine/aromatic dicarboxylic acid repeating units using a nylon salt or its aqueous solution, several problems occur, as described in the paragraph bridging pages 3 and 4 of Applicants' specification.

Against this background, Applicants provide a method wherein the objective polyamide can be efficiently produced while avoiding discoloration and formation of degraded products. Applicants have found that by adding a specified part of the diamine component to a reaction system of the straight-chain aliphatic dicarboxylic acid and the aromatic dicarboxylic acid before the dicarboxylic acid component

changes from a suspension phase to homogenous molten phase, and adding the rest of the diamine component to the reaction system after the dicarboxylic acid component changes to the homogenous molten phase, objectives according to the present invention are achieved. Specifically, a product is formed having a high quality with good and stable properties, while avoiding discoloration and deterioration thereof. Note the last full paragraph on page 4, and the paragraph bridging pages 9 and 10, of Applicants' specification.

Addition of the diamine component, in particular the same diamine component, in different phases, in the specified amounts in each phase, is a feature of the present invention for obtaining the beneficial effects thereof. This can be seen, for example, in a comparison between Example 1 on pages 14 and 15, and Comparative Examples 2-4 on pages 18 and 19, of Applicants' specification. Example 1 is within the scope of the present invention, while in Comparative Example 2 all of the diamine component is added in the homogeneous phase, in Comparative Example 3 10% by weight of the diamine component is added in the suspension phase and the rest added in the homogeneous phase, and in Comparative Example 4 70% by weight of the diamine component is added in the suspension phase and the rest added in the homogeneous phase. The unexpectedly better results achieved by the present invention are seen in comparing the results of Example 1 with the results of the Comparative Examples 2-4.

Harada, et al. discloses a method for producing a copolyamide which contains meta- and para-xylylene diamines as the diamine component and adipic acid as the main dicarboxylic acid component. This patent document addresses the use of the relatively low volatility para-xylylene diamine with relatively high volatility meta-xylylene diamine, and provides the polyamide formed from amounts of meta/para

mixed xylylene diamine by a process described most generally from column 2, line 35 through column 3, line 7. See also column 3, lines 8-10 and 16-22, the paragraph bridging columns 3 and 4; and the paragraph bridging columns 4 and 5.

That is, this patent document discloses that a diamine comprising 35-70 mol% of para-xylylene diamine and 65-30 mol% of meta-xylylene diamine is dropped into the heated dicarboxylic acid continuously or stepwise until a conversion of the dicarboxylic acid approaches 90 mol%; stopping dropping of the diamine before the conversion of the dicarboxylic acid reaches 90 mol%; dropping meta-xylylene diamine or a diamine mixture of 70 mol% or more of meta-xylylene diamine and 30 mol% or less of para-xylylene diamine in place of the diamine continuously or stepwise until a molar ratio of the total of diamines to the total of dicarboxylic acid becomes 0.97-1.3; and heating the reaction system to a temperature higher than a temperature lower by 30°C than the melting point of the finally formed copolyamide before the conversion of the dicarboxylic acid reaches 95 mol%, and elevating the temperature of the reaction system to a temperature higher than the melting point of the finally formed copolyamide upon termination of dropping of the diamine.

It is emphasized that, in step (2) of Harada, et al., a relatively low amount of meta-xylylene diamine (that is, 30-65 mol%) is dropped into the heated dicarboxylic acid. The differential amount of meta- and para-xylylenediamine is added in step (2) due to the different volatilities thereof. It is respectfully submitted that this disclosure in Harada, et al. would have neither disclosed nor would have suggested, and in fact would have taught away from, the presently claimed invention, including wherein, in the step of adding the diamine component dropwise to the suspension, this diamine component comprises 70 mol% or more of m-xylylenediamine.

In addition, it is emphasized that in steps (2) and (3) of Harada, et al., different mixtures respectively of the diamines (that is, different mixtures of meta-xylylene diamine and para-xylylene diamine) are added to the dicarboxylic acid. It is respectfully submitted that this disclosure in Harada, et al. would have taught away from the presently claimed subject matter, wherein "the diamine component" is added in each of Steps 2 and 4; in particular, the disclosure in Harada, et al. would have taught away from the subject matter of claim 10, wherein the diamine component added in Step 4 is the same diamine component as that added in Step 2.

Furthermore, it is noted that according to Harada, et al., and as described in column 4, lines 6-12, this patent document describes the entire reaction system being held "in a uniform fluid state", in dropping the diamine. It is respectfully submitted that the teachings of this patent would have neither taught nor would have suggested the presently claimed subject matter, including adding specified amounts of diamine component to a suspension of the aromatic dicarboxylic acid in a molten straight-chain α, ω-aliphatic dicarboxylic acid, and adding specified amounts of diamine component while maintaining the homogenous molten phase, as in the present invention, and advantages achieved thereby as discussed in the foregoing.

Specifically, it is respectfully submitted that in the production method of Harada, et al., the different diamines added in the steps (2) and (3) are switched from one to the other when the conversion of the dicarboxylic acid reaches a specific level. In contrast, according to the present invention the addition of the diamine component is divided into two stages respectively when the reaction system is in a suspension phase and is in a homogenous molten phase. Such switching as in Harada, et al., based upon when the conversion of the dicarboxylic acid reaches the specific level, would have neither taught nor would have suggested the presently

claimed subject matter, wherein addition of the diamine component is divided into two stages based upon the phase of the reaction system.

Contentions by the Examiner in the paragraph bridging pages 2 and 3 of the Office Action mailed June 9, 2005, supporting the Examiner's conclusion as to anticipation by Harada, et al., of the presently claimed subject matter, are respectfully traversed. As shown in the foregoing, the presently claimed subject matter is different from, and not anticipated by, the teachings of Harada, et al.; and, moreover, as also shown in the foregoing, it is respectfully submitted that Harada, et al. would not have suggested the presently claimed subject matter.

Applicants respectfully traverse the obviousness-type double patenting rejection, set forth on pages 3 and 4 of the Office Action mailed June 9, 2005. As will be shown in the following, it is respectfully submitted that the subject matter claimed in No. 5,587,447 would have neither taught nor would have suggested the presently claimed subject matter.

Initially, note that U.S. Patent No. 5,587,447 and the applied European patent application to Harada, et al. both claim priority based upon the same Japanese patent application, and contain corresponding disclosures. Arguments made in the foregoing with respect to the applied European patent application to Harada, et al., are also applicable to the obviousness-type double patenting rejection.

That is, claim 1 of No. 5,587,447 recites dropping a diamine comprising, inter alia, 65-30 mol% of meta-xylylene diamine into the heated dicarboxylic acid stepwise or continuously before a conversion of the dicarboxylic acid reaches 90 mol%. Such disclosure would have taught away from the presently claimed subject matter, including, inter alia, Step 2 of adding the diamine component comprising at least 70 mol% of m-xylylenediamine dropwise to the suspension while

maintaining the reaction system at the recited temperature. Moreover, it is respectfully submitted that the claims of No. 5,587,447 do not contemplate, nor would have disclosed or suggested, the addition of relative amounts of the total amount of the diamine component in the suspension phase and in the homogenous molten phase and advantages achieved thereby; and would have neither taught nor would have suggested adding "the diamine component" in these two stages, with advantages achieved as in the present invention.

The contention by the Examiner that the above-identified application and No. 5,587,447 "are viewed as claiming [overlapping] subject matter" is respectfully traversed. As discussed previously, clearly amount of m-xylylenediamine added does not overlap. In view of differences in purpose, and as there is no overlap, it is respectfully submitted that the obviousness-type double patenting rejection is clearly improper.

Furthermore, it is also emphasized that in the subject matter claimed in No. 5,587,447, different diamine compositions are added in steps (2) and (3), in view of the purpose of No. 5,587,447 of avoiding problems with respect to addition of diamines having different volatilities, as discussed previously. It is respectfully submitted that No. 5,587,447. would have neither disclosed nor would have suggested, and in fact would have taught away from, "the" diamine component being added in both Steps 2 and 4, in particular, wherein the diamine component added in Step 4 is the same diamine component as added in Step 2 (see claim 10).

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

Docket No. 396.43841X00
Serial No. 10/849,027
September 9, 2005

Applicants request any shortage of fees due in connection with the filing of this paper be charged to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (case 396.43841X00), and credit any excess payment of fees to such Deposit Account.

Respectfully submitted,

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